REMARKS

1. Claim 1-27 were rejected under 35 USC 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. In claim 1, line 8, the examiner questioned what is "geo-referenced". Claim 1 has been amended for clarity.

In claim 1, line 6, the examiner found the phrase "such as" to be vague and indefinite. It has been amended for clarity.

2. Claim 1 was rejected because of the informalities on lines 5 and 8. They have been corrected and amended.

4. Claims 1-27 are rejected under 35 USC 103(a) as being unpatentable over Kosalos et all ('931) when taken in view of White et al ('484) or Campbell et al ('264) or Geohegan, Jr. et al ('240) or Johnson et al ('827).

The Office Action states that the difference between applicant's independent claim 1 and the Kosalos et al system is that the applicant claims include at least "one of a roll, tilt and yaw sensor" and "a latitude and longitude sensor such as a GPS". The Office Action further states that Campbell et al, Geohegan et al, and White et al teach sonar systems which include roll and pitch sensors and that it would have been obvious to combine the use of such sensors as taught by Campbell, Geohegan and White with the system described by Kosalos. Additionally, the the Office Action states that Johnson et al teaches the use of a heading sensor in sonar tracking systems for providing position information and a highly accurate time-of-day.

Claim 1 as amended recites: "A sonar system, comprising...circuitry adapted to calculate the geographical location of coordinates within said image data based upon the geographical location of the sonar system and the orientation of the sonar system relative to its location and wherein said image data includes coordinate data with respect to a frame of reference fixed with respect to earth."

Applicants submit that the combination urged in the Office Action would not result in the system as claimed. In addition, the secondary references do not commend themselves to their combination with the structure defined by applicant's claims. These points are substantiated in the following discussion.

Kosalos et al describes a system and a method that is based on interferometric processing, which is incapable of doing what is required in the claim. In the interferometric process described by Kosalos, the system has to be translated in space to gather data from multiple positions and then aggregate this information together to create a single model. The Kosalos system, not surprisingly, is quite clear about the requirement . See, for example, the text at col. 2, ll. 51-58:

> "Azimuth, elevation and range are calculated over a statistically large number of spatially diverse backscatter returns and used to construct a histogram of backscatter data. The histogram of backscatter data can be processed with standard image processing techniques to produce terrain maps or volumetric models of the volume of water"

Kosalos makes no mention of producing geographical references to the images produced by his system.

Claim 1 states that the "said image data includes coordinate data with respect to a frame of reference fixed with respect to earth" as claimed. Thus, even if the secondary references are combined with Kosalos, the result will not be what is claimed. Claim 1 is also patentably distinct from prior art showing sonar beam forming in combination with the secondary references. The secondary references are discussed below.

Campbell describes an invention that that is used to "locate, track, and navigate over a cooperative target" where a cooperative target is any that emits an active signal source. Campbell teaches the use of a universal joint to compensate mechanically for the roll and pitch motion of a ship. In part, it commends itself only for use as a means for stabilizing an instrument such as a sonar system. However, in addition to using the admittedly well known (if not ancient) gimbal-type stabilization for a single-beam receiver, Campbell teaches to compensate the analog signals corresponding to the angular direction coming from the hydrophone angle indicator as a function of tilt. This describes a method of measuring the physical orientation of the sonar system's hardware even as the ship pitches and rolls. Campbell does not teach the orientation of sonar data to allow for the referencing of the the image generated from that sonar data to a fixed from of reference or a geographical location as required by the claim recitation, "output, image data, responsively to said at least one of a roll, tilt, and yaw sensor and to <u>calculate the geographical location of coordinates within said image data based upon the geographical</u>

<u>location of the sonar system and the orientation of the sonar system relative to its location and wherein said image data includes coordinate data with respect to a frame of reference fixed with respect to earth</u>". Campbell does not use the angle information for such a purpose.

Geohegan et al teach the use of roll and tilt sensors to select portions of the sonar's field-of-view to process. Geohegan states "In order to perform the correlation to be described, it is necessary that the correlation be performed on return signals of the first and subsequent pulse transmissions as received from the same bottom strip. This will not be accomplished if the underwater platform carrying the transducer array is oriented in a different direction from the first pulse transmission to the other. Accordingly, there is provided a yaw, roll and pitch correction circuit 70 which is responsive to yaw, pitch and roll sensor signals (not illustrated) to steer the beams resulting from the other transmission into alignment with those of the first transmission, if required." Geohegan explicitly uses roll and tilt sensors to ensure that areas imaged with multiple pings that are used for the ping-to-ping correlation described correspond to the same locations and to steer the beams associated with future transmissions based on earlier transmissions. Because Geohegan requires the correlating between corresponding parts of a return, taken at different times with the ship at different orientations, the samples need to be rotated relative to each other. To fulfill this requirement, Geohegan teaches that the roll and tilt information collected is used to specifically select the angle at which to steer the beam at the next transmission.

Geohegan's technique does not describe generating an image from the sonar data. Additionally, Geohegan teaches the requirement of multiple transmissions for single data operation. Geohegan does not teach: "circuitry adapted to collect and reduce said raw data signal to, and output, image data ... where said system is capable of generating a complete image with a single transmission" and a person of ordinary skill would have no motivation to look to the Geohegan reference for guidance

White et al teach the use of a tilt sensor to identify "pitch nulls", times when a platform is in an appropriate orientation to ensure that the image generated by the sonar will not have adverse effects caused by in improper pitch orientation of the sonar. The sonar taught by the applicant does not involve such problems and a person of ordinary skill would have no motivation to look to the White reference for guidance.

Johnson et al teach the use of a GPS as part of an overall fish monitoring system that includes the uses of two sonar systems. As pointed out by the Examiner, GPS receivers can be used to generate both position and timing data. Johnson, however, only makes use of the timing information provided by the gps in the sonar process described in his invention. Johnson teaches that position and roll/pitch orientation data is recorded, but nowhere is it taught to use that position or orientation information is used in processing of the sonar data. In fact Johnson specifically sates that "each target position is converted to Cartesian coordinates with the origin at the sonar heads". Johnson does teach that "the central processor 40 correlates the data flow with the GPS clock" and that "the data [is] output to a file for the current time". Therefore, Johnson fails to teach that the position

information produced by a GPS or roll and pitch information from a roll and pitch sensor are used to " calculate the geographical location of coordinates within said image data based upon the geographical location of the sonar system and the orientation of the sonar system relative to its location and wherein said image data includes coordinate data with respect to a frame of reference fixed with respect to earth".

Applicants note that the concept of stabilizing a shipboard environment from the motion of the ship is a very old concept. Candles and magnetic compasses mounted on mechanical gimbals are examples of roll and pitch compensation methods employed for hundreds of years. The mere concept of wanting to compensate for roll or pitch is not claimed by the applicant. None of the prior art combinations discussed motivates a system which can be described by the applicant's amended claim 1 and as stated in the basis of rejection of independent claim 1 in the Office Action. The Office Action therefore has failed to provide a prima facie basis for rejection and Applicants therefore respectfully propose that the rejection of claim 1 should be withdrawn.

Furthermore, the basis of rejection of dependent claims 2-27 was based upon the rejection of claim 1 as being "specific to the sonar signal processing system and structure which is provided by the Kosalos patent and additional reference patents." Thus, Applicants respectfully propose that no basis for the rejection of claims 2-27 was given in the Office Action and therefore Applicants request that the rejection be withdrawn or a new argument provided.

5. If the Examiner requires clarification of any issues raised in this response, the Examiner is invited to call the undersigned at (401) 784-6700.

Respectfully submitted,

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